

5.13 Underground Cable Installation

5.13.1 General

- These notes in general cover cables upto and including 33 kV rating.

- Electrical installation work shall comply with all currently applicable statutes, regulations and safety codes in the locality/country where the installation is to be carried out.
- Installation of cables shall be carried out generally as per IS 1255 or relevant applicable IEC standards and enclosed typical drawings.
- Installation of cables shall include unloading, storing, laying, fixing, jointing, termination and all other work necessary for completing the job. Supply of glands and lugs whenever specified, together with necessary materials for jointing and termination shall also be included in Contractor's scope.
- Construction of cable trenches, provision of embedment and similar work involving civil items will be carried out as per the instructions/notes on the respective project drawings and installation specification.
- Cables will be installed in trenches, trays, racks, tunnels, conduits, duct banks or directly buried. The actual cable layouts will be shown on the relevant drawings. Any changes, if necessary, after obtaining prior approval of the Engineer shall be carried out at site by the Contractor and shall be clearly marked by him on drawings.
- Cables to each circuit shall be laid in one continuous length.
- Where cables are to be installed at temperatures below 3 ° C, they shall be heated to about 10 ° C for not less than 24 hours (in a heated building or in a tent with hot air heater) to facilitate laying (otherwise the bending would damage the insulation and protective coverings of cables). The cable laying must be carried out swiftly so as not to allow the cable to cool down too much.
- Instead of cast iron cable route marker, plastic marking tape may be used for UG which shall run along the length of the cable and shall have cable marking at every 1.5meter length.

5.13.2 Outdoor Cable Installation

- Directly buried cables shall be laid as per the drawings and cable route markers shall be provided. MS cable marker to be replaced by plastic marker buried cables in trefoil formation shall be bound by plastic tapes or 3mm dia. nylon core every 750 mm.
- Joints in directly buried cables shall be identified by joint markers at each joint location.
- In each outdoor cable run greater than 50 metre, some extra cable length shall be kept at a suitable point to enable a straight through joint to be made should the cable develop fault at a later date.
- Where cables cross roads, water or sewage pipes, the cable shall be laid in hume or steel pipes. For road crossings the pipe for the cable shall be buried at not less than

600 mm unless otherwise noted in the drawings. Hume pipes shall be preferred to steel pipes from the point of view of corrosion.

- Control cables and small power cables in trenches and tunnels shall be run in ladder type cable trays (maximum tray width 600 mm) supported on trench/tunnel carrier arms. The cables shall be laid to tray rungs by means of 3mm dia. nylon cord at an interval of 5000 mm and also at bends.
- For good sealing arrangement at entry points, suitable pipe sleeves, adequate in number and of adequate sizes shall be provided in building walls/slabs for passage of cables into a building from cable trays/racks/cable trenches located outside the buildings.

5.13.3 Bending Radii for Cables

The bending radii for various types of cables shall not be less than those specified below, unless specifically approved by the Engineer.

Description	Single Core	Multicored Armoured	Multicored Unarmoured
PVC insulated cable upto 11 kV	20 D	12 D	15 D

Where D = Overall diameter of cable.

(For XLPE insulated cables, recommendations of manufacturers to be followed).

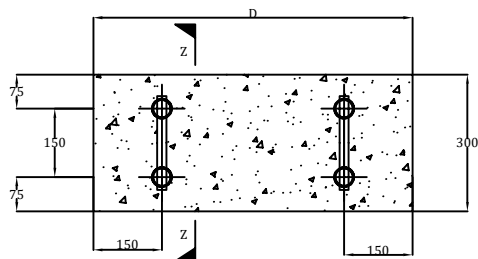
The above values may be reduced to 70% when making only one bend such as in case of installing an end termination

5.13.4 Terminations Clamping & Miscellaneous Details

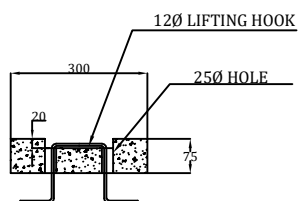
- Cable entry to motors, push button stations and other electrical devices shall be from the bottom as far as possible or from the sides. Top entry shall be avoided particularly for outdoor equipment.
- Identification tags made from aluminium sheet shall be attached to each end of each cable by means of GI binding wire as shown in drawing. Tags shall be additionally put at an interval of 30 meters on long runs of cables and in pull boxes.
- All cable terminations shall be solderless crimping type. Whenever lugs are required to be supplied, adequate size crimping lugs of approved make shall be used by the Contractor. The crimping tools shall be adequate for the lug sizes.
- Wooden cleats when required for vertically supporting on or more single core cables per phase, such as on vertical framework near transformer cable boxes, shall be made out of well seasoned wood given two coats of fire retarding paint of approved quality.

5.13.5 Earthing of Cables

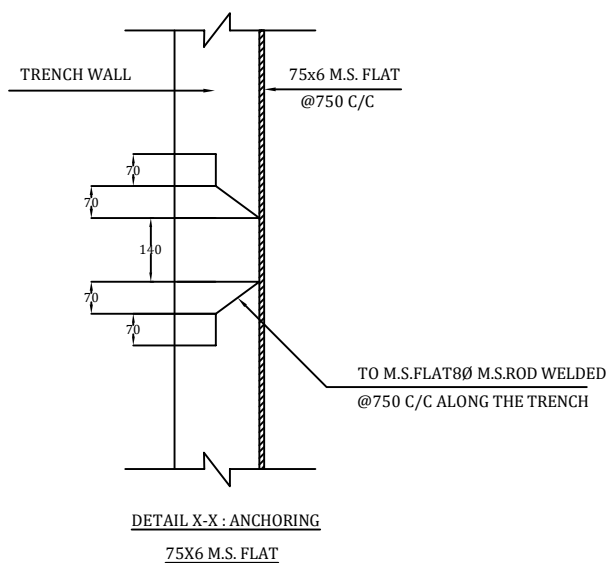
- Metallic sheaths, screens and armour of all multi-core cables shall be earthed at both equipment and switchgear end.
- Sheath and armour of single core power cables shall be earthed at switchgear end only. If specifically indicated in drawings, for long lengths of cables multiple earthing may have to be adopted to safeguard against the presence of standing voltage under normal as well as fault conditions.
- Earthing of CT and PT neutral lead shall be at one end only.



RCC cover slab plan

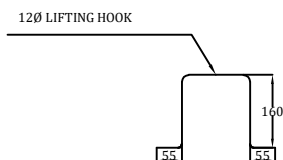


SECTION Z-Z COVER SLAB

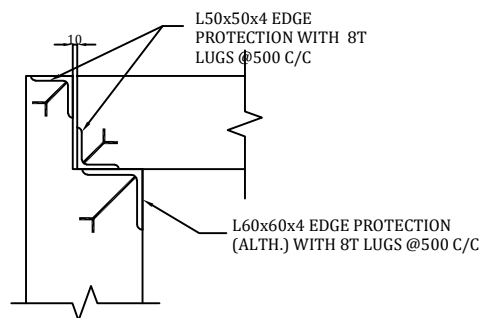


DETAIL X-X : ANCHORING

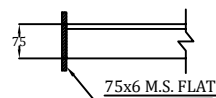
75X6 M.S. FLAT



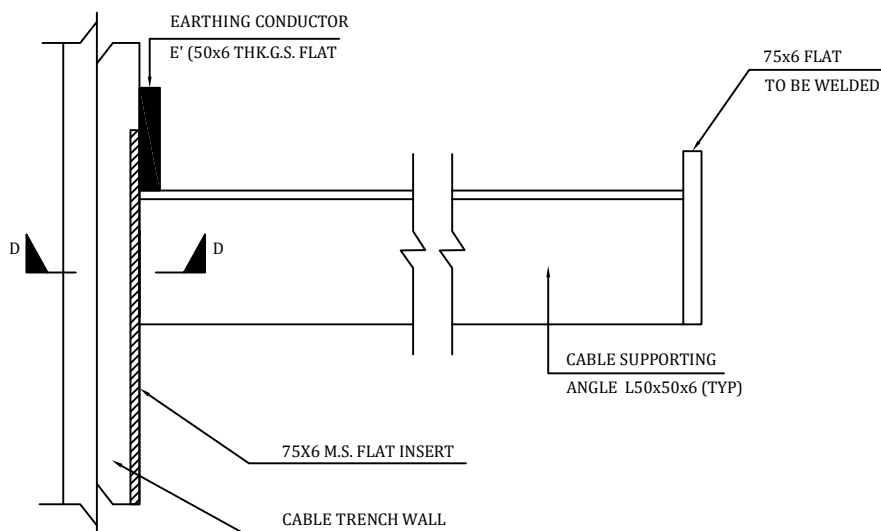
DEF. OF LIFTING HOOK



DETAIL Y-Y
TYPICAL DETAIL OF CABLE
TRENCH EDGE PROTECTION



SECTION D-D



TYP. CABLE SUPPORT EARTH CONDUCTOR
E' RUNS ON TOP TIER ONLY



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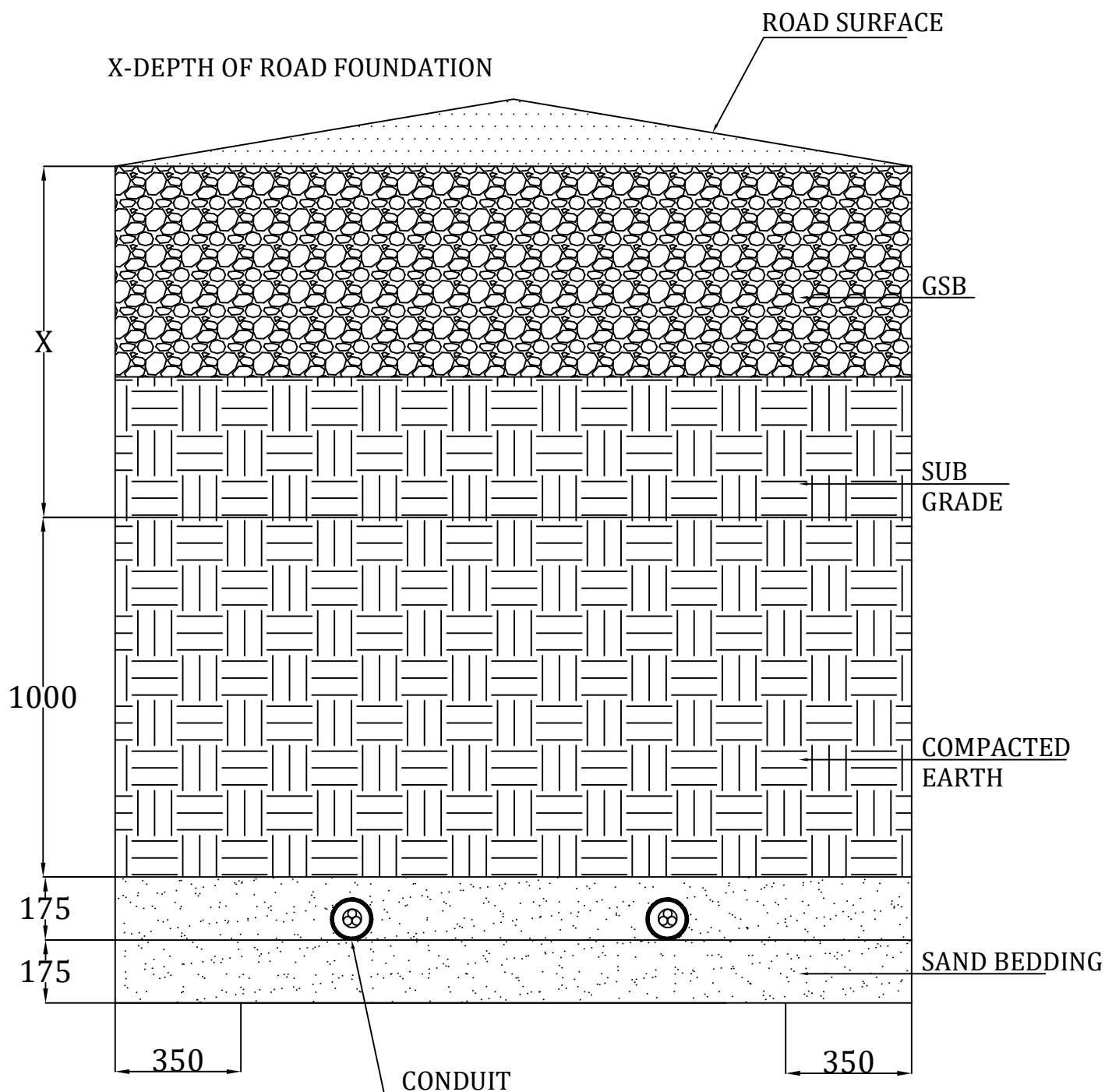
ENGINEERING AND RESEARCH DIVISION

TITLE: DISTRIBUTION DESIGN & CONSTRUCTION STANDARD
INSTALLATION PRACTICE -DETAILS OF SLABS, LIFTING HOOKS &EDGE

DRAWING NO. BPC - DDCS - 2023 - 1B & C

REVISION
2023

	NAME	DATE
DESIGNED BY		
CHECKED BY		
APPROVED BY		



DIRECTLY BURIED CABLES WITH CONDUIT



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TITLE: DISTRIBUTION DESIGN & CONSTRUCTION STANDARD

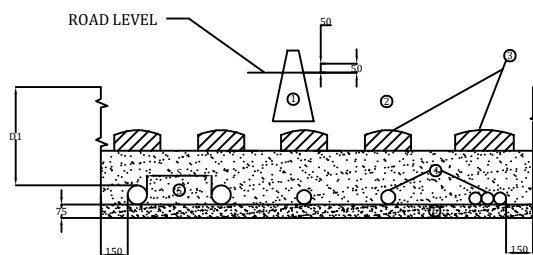
INSTALLATION PRACTICE -CONDUIT METHOD

	NAME	DATE
DESIGNED BY		
CHECKED BY		
APPROVED BY		

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2023

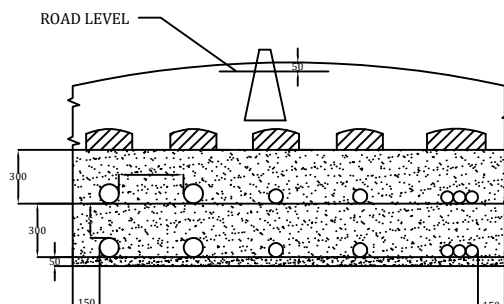
INSTALLATION OF DIRECTLY BURIED CABLES



DIRECTLY BURIED CABLES IN SINGLE LAYER

LEGEND

- (1) - CABLE ROUTE MARKER IF PROVIDED.
- (2) - EARTH BACK FILLED & RAMMED.
- (3) - PROTECTIVE COVERS, AS PER IS 1255
- RCC/SLABS/BRICKS FOR HIGH VOLTAGE CABLES.
- (4) - ARMOURED POWER CABLE.
- (5) - FINE SAND/RIDDLED SOIL COMPACTED.
- (6) - SAND BEDDING.



DIRECTLY BURIED CABLES IN TWO LAYERS

DIMENSION (MIN)	1100V GRADE CABLES	11kV	33kV
D1	600	1000	1000
S	d-BETWEEN CABLES OF SAME CLASS *300mm- BETWEEN CABLES OF DIFFERENT CLASS *400mm- BETWEEN 1-CORE POWER CABLE AND COMMUNICATION CABLE *400mm- BETWEEN MULTICORE POWER CABLE AND COMMUNICATION CABLE		

- d. -OVER ALL DIAMETER OF THE BIGGER OF THE TWO CABLE
- * - SPACING SHALL BE KEPT BOTH HORIZONTALLY AND VERTICALLY

NOTE

- SINGLE CORE CABLES SHALL BE RUN IN TREFOIL FORMATION AND SHALL BE BOUND BY PLASTIC TAPES OR 3mm DIA NYLON CORE EVERY 750mm.
- PLASTIC MARKING TAPE TO BE USED FOR UG WHICH SHALL RUN ALONG THE LENGTH OF THE CABLE AND SHALL HAVE CABLE MARKING AT EVERY 1.5 METER LENGTH.
- CABLE IDENTIFICATION TAG SHALL BE TIED AT BOTH ENDS OF THE CABLE AND ALSO AT AN INTERVAL OF 15 METRES.
- IF THE MINIMUM CLEARANCE AS INDICATED IN THE ABOVE TABLE FOR CABLES OF DIFFERENT CLASSES ARE NOT FEASIBLE, BRICK BARRIERS SHALL BE USED BETWEEN ADJACENT CABLES.
- GI./HUME PIPE SHALL BE PROVIDED FOR ROAD CROSSING.



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ENGINEERING AND RESEARCH DIVISION

TITLE: DISTRIBUTION DESIGN & CONSTRUCTION STANDARD
INSTALLATION PRACTICE - DIRECTLY BURIED CABLES

DRAWING NO. BPC - DDCS - 2023 - 1A

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2023